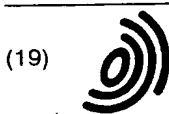


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(54) A ceiling-mounted device for ventilating rooms and, at the same time, cooling or heating the room air.

(57) Ceiling-mountable device for ventilating rooms and, at the same time, cooling and/or heating the room air, which device has two longitudinal channels (11,11') for supply of primary air, two elements (12) for cooling/heating of room air, two mixing chambers (13) for cooled/heated room air and primary air, nozzles (17) for supply of primary air to each mixing chamber (13), and

outlet openings (15). Air supplied through the primary air channels (11,11') flows through the nozzles (17) along the inclined side (22) of each channel and produces an induction effect, which serves to suck in room air (20) via each element (12) and for its further passage through the elements to each mixing chamber (13) and out through the outlet openings (15) close to the ceiling (10), as shown by the arrows (21).

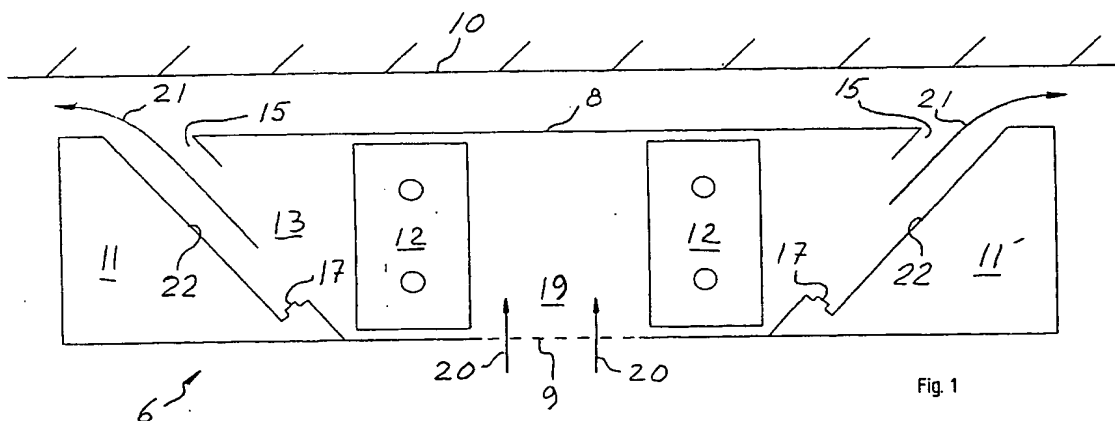


Fig. 1

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Description

[0001] The present invention relates to a ceiling-mounted device for ventilating rooms and, at the same time, cooling or heating the room air, of the kind appearing from the preamble of the following patent claim 1.

[0002] Previously known, ceiling-mounted ventilating and cooling/heating devices of the free-hanging kind, which thus are to be completely mounted under the ceiling and not, like other ceiling-mounted devices, completely or partly flush-mounted in the ceiling, all are afflicted with a number of drawbacks. As these freely hanging baffles have their air intakes arranged for upper inflow, which necessitates openings for circulation of 50-100 mm between ceiling and baffle, and the outflow takes place in the lower part, this arrangement calls for a high-up situated ceiling, in order to avoid unnecessary draught. Another drawback is that the outflow of heated/cooled room air cannot be performed along and close to the ceiling, which is desirable, partly, for optimizing the flow pattern and, partly, for achieving smallest possible feeling of draught in the room. Thus, the outflow in previously known freely hanging devices has to occur in the lower part of the device like in the previously known recessed devices. This in turn brings about a further drawback, viz. that outflowing treated air will cross-flow the room air sucked into the device from above. Thus, in the recessed devices, the problem of locating the outflow close to and along the ceiling is solved simply by the recessed mounting so that the lower part of the device is flush with or close to the level of the ceiling. Here is referred to, for example, the devices described in our previous publications EP-B-0692084, EP-A-0857223 and in applications SE-A-9802215-5, SE-A-9802216-3 and SE-A-9900214-9, which devices thus all make it possible to locate the outflow of the treated air into the room close to and along the ceiling of the room.

[0003] One object of the present invention is to provide an improved ceiling-mounted device with freely hanging baffle of the kind mentioned by way of introduction, which is not afflicted with the drawbacks previously occurring. Thus, the device according to the invention offers a smaller overall height than could be achieved with previously known freely hanging baffles, at the same time as the outflow of conditioned air takes place close to and along the ceiling. Even the implied problem of crossing air streams can be completely avoided. With the present invention, it is possible to further bring down the overall height by using two primary air channels instead of a single one, which primary air channels therefore each can be manufactured with a smaller cross-section.

[0004] According to the invention, this is achieved by the characterizing features of claim 1. Advantageous embodiments, developments and improvements appear from the dependent claims.

[0005] Some of the important advantages which can be achieved by the invention compared to previously

known freely hanging constructions might be summarized as follows:

[0006] Recirculating air (warm) is here completely separated from the mixture of recirculating-/primary air (cold). Previously known freely hanging devices involve problems with crossing airstreams which create turbulence, as inflowing warm recirculating air, flowing upwards along the vertical side of the baffle, is forced to pass (cross) a horizontally outflowing mixture of cold primary air/recirculating air from the vertical side of the baffle.

[0007] A smaller overall height is required due to the fact that the baffle advantageously can be mounted snug against the ceiling. The air throw for conditioned exhaust air mixed with primary air is prolonged due to the fact that the air mixture can be blown out along with and directly bearing on the ceiling. A prolonged air throw increases the intermix of room air, which will bring about a lesser risk of draught due to a more efficient use of ceiling and walls.

[0008] The invention will now be described in more detail with reference to the embodiments shown on the accompanying drawings. In SE-A-9900214-9, the fundamental advantages of the invention compared to previously known technique (prior art) are described in detail and are therefore not described further here. Figs. 1-4 show schematic diagrams of four different preferred embodiments of the invention of which Fig. 1-2 show devices with two triangular primary air channels and one element arranged vertically and parallel to the ceiling adjacent each primary air channel, and Figs. 3-4 show different variants which could be of current interest with a single element arranged horizontally between the two primary air channels.

[0009] Figs. 1 and 2 show a device according to the invention with a freely hanging baffle 6 seen in cross-section, which baffle 6 is provided with an upper part 8 and a bottom part 9 and is arranged close to a ceiling 10 and which baffle has two longitudinal primary air channels 11, 11' and two elements 12 for cooling/heating of room air. Between each element 12 and the adjacent primary air channel 11, 11' there is a mixing chamber 13 with an outlet opening 15, said mixing chamber 13 being intended for mixing of primary air, which has been supplied through primary air supply means 17 of the primary air channels and through the medium of an induction effect by means of this primary air sucked-in room air, which has passed the element 12, and doing so has been cooled or heated depending on the predetermined serviceability of the device.

[0010] Below and between the elements 12, a distribution chamber 19 is indicated in which the room air is distributed all over each element 12 before passing it. During operation, the device is supplied with primary air through the channels 11, 11' with such energy that it through the medium of an induction effect, i.e. causing a negative pressure or vacuum to occur in the mixing chamber 13, will suck in room air from below into the

5 baffle 6, as the arrows 20 indicate. This room air is subsequently sucked horizontally in both directions through the respective element 12 and into the corresponding mixing chamber 13, where it meets and gets mixed with primary air supplied by the means 17, which can be formed as nozzles 17, slots 17' or the like. The air conditioned and mixed in this way is blown out through the openings 15 close to the ceiling 10 and in horizontal direction as shown by the arrows 21.

10 [0011] All the devices according to Figs. 1- 4 have a baffle 6, elements 12 for cooling/heating, mixing chambers 13, primary air supply means 17, outlet openings 15 and a distribution chamber 19. Common for the embodiments of the invention is that the mixing chambers 13 are arranged at the side of or obliquely above the elements 12, while the distribution chamber 19 is arranged between or below said elements. Further, the primary air supply means 17, 17' are arranged in mutually opposite, in the embodiments triangular primary air channels 11, 11'. The triangular shape of the channels essentially corresponds to a right-angled triangle and the channels are arranged with their hypotenuses facing each other and the catheters constituting vertical and horizontal sides, respectively, of the baffle 6. The nozzles 17 or slots 17' are arranged close to the bottom side of the baffle 6 and so directed that primary air supplied therethrough flows upwards along the hypotenuses or oblique walls 22 of the channels towards the outlet openings 15. Thus, the negative pressure or vacuum is produced which is required to make possible that room air 20 will be sucked in via the distribution chamber 19 and through the respective element or elements into the mixing chambers 13 to be mixed with the primary air, and finally, as shown by the arrows 21, flow out through the outlet openings 15 at the underside of the ceiling 10.

30 [0012] According to the invention, the room air may be led into the distribution chamber 19 by the fact that its bottom part 9 is formed as a perforated sheet, a screen gear or is provided with one or more slots. This is shown in the figures by means of a dashed line.

40 [0013] The baffle 6 can be placed close to the ceiling, which is indicated in Figs. 1, 2 and 4 or freely hanging down, as shown in Fig. 3. When the baffle 6 is arranged close to the ceiling, the top portion of the mixing chamber can with advantage consist of the ceiling 10. The baffle 6 may also comprise a separate top portion 24, which is mandatory in the case of the freely hanging down embodiment but even might be used for baffles intended to be arranged close to a ceiling. In the embodiments of Fig. 1 and 2, two elements 12 are arranged vertically at the oblique or inclined sides or walls 22 of the respective primary air channels 11, 11'. Thus the inlet and outlet sides of the elements 12 are vertically arranged, which means that the outlet sides of the elements constitute a vertical delimitation of each mixing chamber 13 while their inlet sides vertically delimit a distribution chamber 19 between each other.

55 [0014] In the embodiments according to Figs. 3 and

4, which have a single horizontal element, i.e. with the inlet sides and the outlet sides horizontally arranged, the mixing chambers 13 merge into each other at the upper side of the element while the distribution chamber 19 is situated between the underside (inlet side) of the element 12 and the bottom part 9 of the baffle.

[0015] Even if the embodiment according to Fig. 1 is shown with primary air supply means in the shape of nozzles 17 and the embodiments according to Figs. 2-4 with slots 17', the nozzles may naturally be applied to the embodiments according to Figs. 2-4, and vice versa. The baffle 6 of the embodiments according to Figs. 1, 2 and 4 may also be provided with such a separate top portion 24, as is illustrated in the embodiment according to Fig. 3.

[0016] Since the device according to the invention is provided with two primary air channels, it is possible to achieve the required flow capacity with a baffle height less than 100 mm.

Claims

1. Device for ventilating rooms and, at the same time, cooling and/or heating the room air, which device comprises a to a ceiling (10) of a room mountable baffle (6) for cooling/heating, said baffle having an upper part (8), a bottom part (9) and at least one channel (11, 11') for supply of primary air, at least one element (12) for cooling/heating of room air, at least one mixing chamber (13) for mixing cooled/heated room air and primary air, means (17) for supplying primary air to the mixing chamber (13) and at least one outlet opening (15) for the outflowing mixture of cooled/heated room air and primary air, **characterized in that** the element (12) is arranged in a central portion of the baffle (6), which has openings in its bottom part (9) for receiving room air near the inlet side of the element (12),

the primary air channel (11, 11') is arranged beside the element (12) and has an inclined wall (22) facing towards the element, the inclined wall and the opposing side of the element (12), near its outlet side, delimit a mixing chamber (13) having an upwardly increasing width, the means (17) for supplying primary air are arranged near the bottom part (9) and in the inclined wall (22) and directed upwards along the same, and

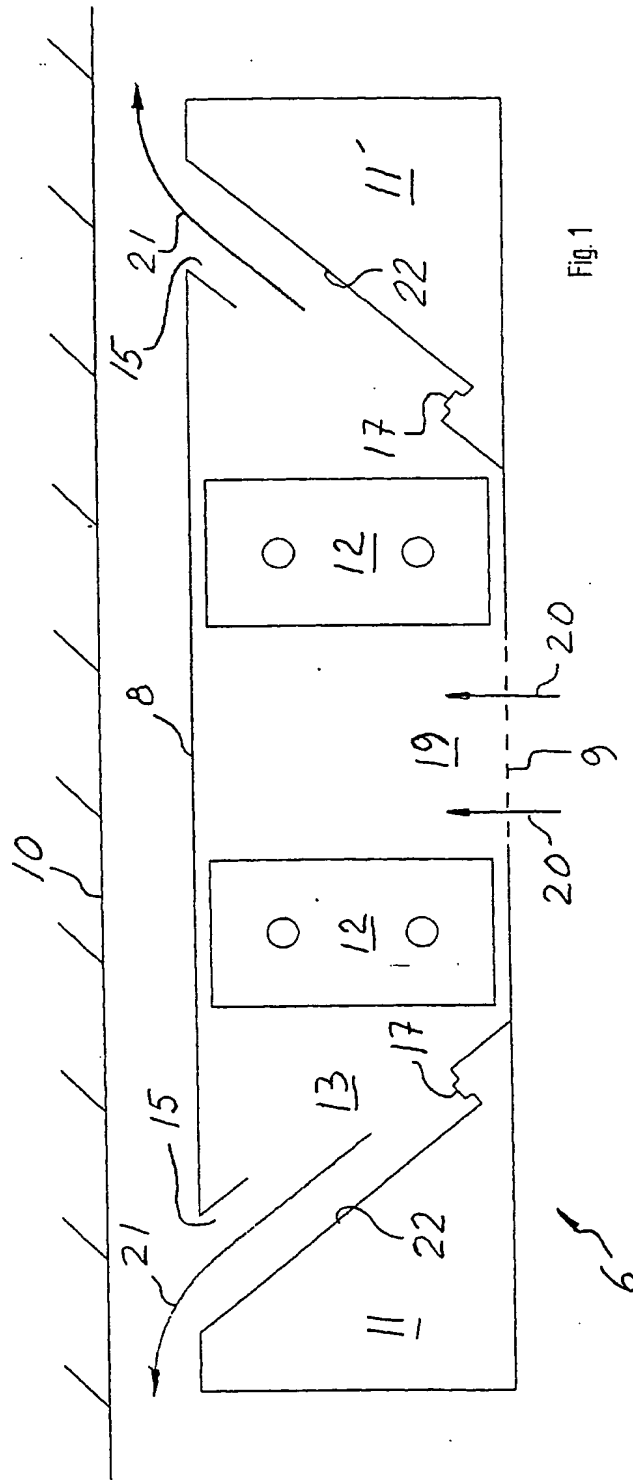
that the outlet opening (15) is arranged between the inclined wall (22) of the primary air channel (11, 11') and the upper part (8), the device in the mounted state having the outlet opening (15) of the mixing chamber (13) situated near the ceiling (10) of the room, in order to ensure a horizontal outflow of the air mixture

close to and along the ceiling.

2. Device according to Claim 1, **characterized in** that a distribution chamber (19) is arranged adjacent the inlet side of the element (12) for receiving room air flowing in through the openings in the bottom part (9) of the baffle and for distributing the received room air to the element (12). 5
3. Device according to Claim 2, **characterized in** that the bottom part (9) of the distribution chamber comprises a perforated sheet. 10
4. Device according to Claim 2, **characterized in** that the bottom part (9) of the distribution chamber comprises one or more slots. 15
5. Device according to Claim 2, **characterized in** that the bottom part (9) of the distribution chamber comprises a screen gear. 20
6. Device according to one of Claims 1- 5, **characterized in** that a primary air channel (11,11') is arranged on both sides of a single element (12). 25
7. Device according to one of Claims 1- 5, **characterized in** that an element (12) is arranged adjacent each primary air channel (11,11').
8. Device according to Claim 6 or 7, **characterized in** that the mixing chambers (13) are provided with upper delimiting surfaces embodied in the form of a separate top portion (24). 30
9. Device according to Claim 6 or 7, **characterized in** that the upper delimiting surfaces of the mixing chambers (13), in a mounted state, are constituted by the ceiling (10) itself. 35
10. Device according to Claim 6, **characterized in** that the single element (12) is installed horizontally. 40
11. Device according to Claim 7, **characterized in** that the elements (12) are installed vertically. 45
12. Device according to Claim 6 or 7, **characterized in** that the primary air channels (11,11') are shaped so that their mutually opposing sides, in the mounted state of the device, each have an inclined wall (22) obliquely arranged relative to the ceiling (10). 50
13. Device according to Claim 12, **characterized in** that the means (17) for supplying primary air are arranged on the cross-section portions of the respective primary air channel (11,11') which are situated at the mutually shortest distance and arranged to guide the primary air along said opposing sides and, after having been mixed with room air, to flow out 55

through the respective outlet opening (15) close to the ceiling (10).

14. Device according to one of Claims 1-13, **characterized in** that the means (17) for supply of primary air are constituted of nozzles (17).
15. Device according to one of Claims 1-13, **characterized in** that the means (17) for supply of primary air are constituted of slots (17').



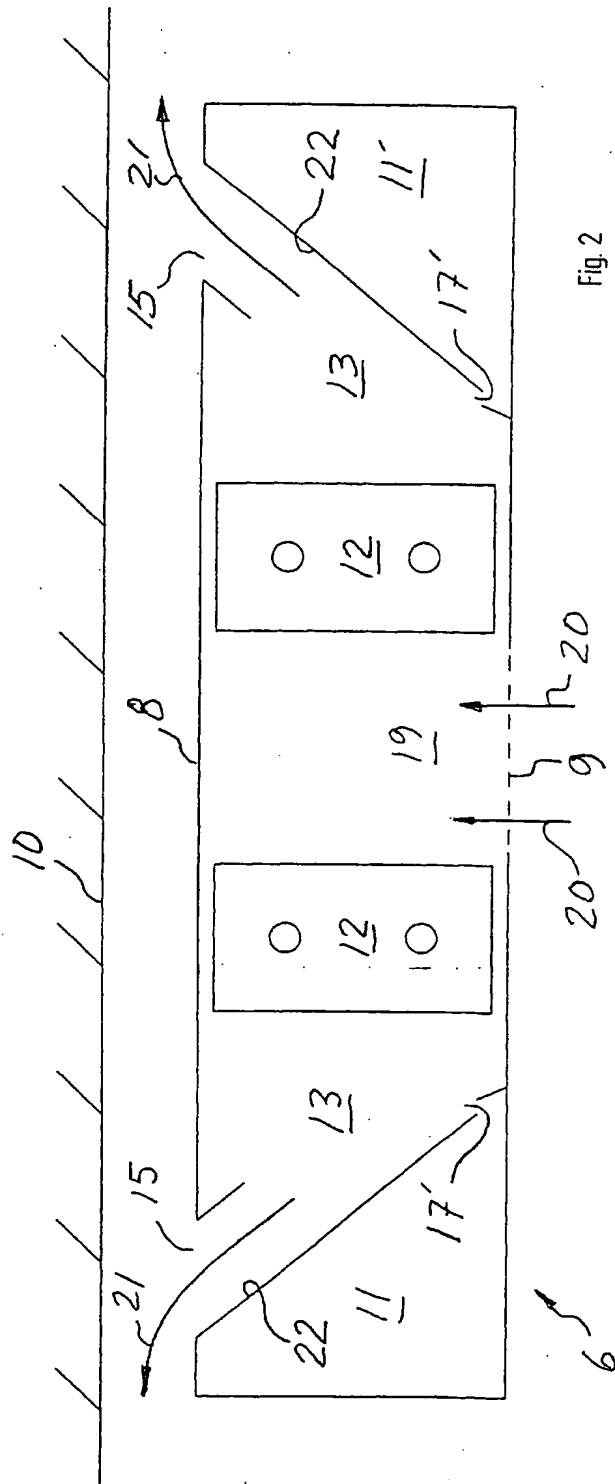


Fig. 2

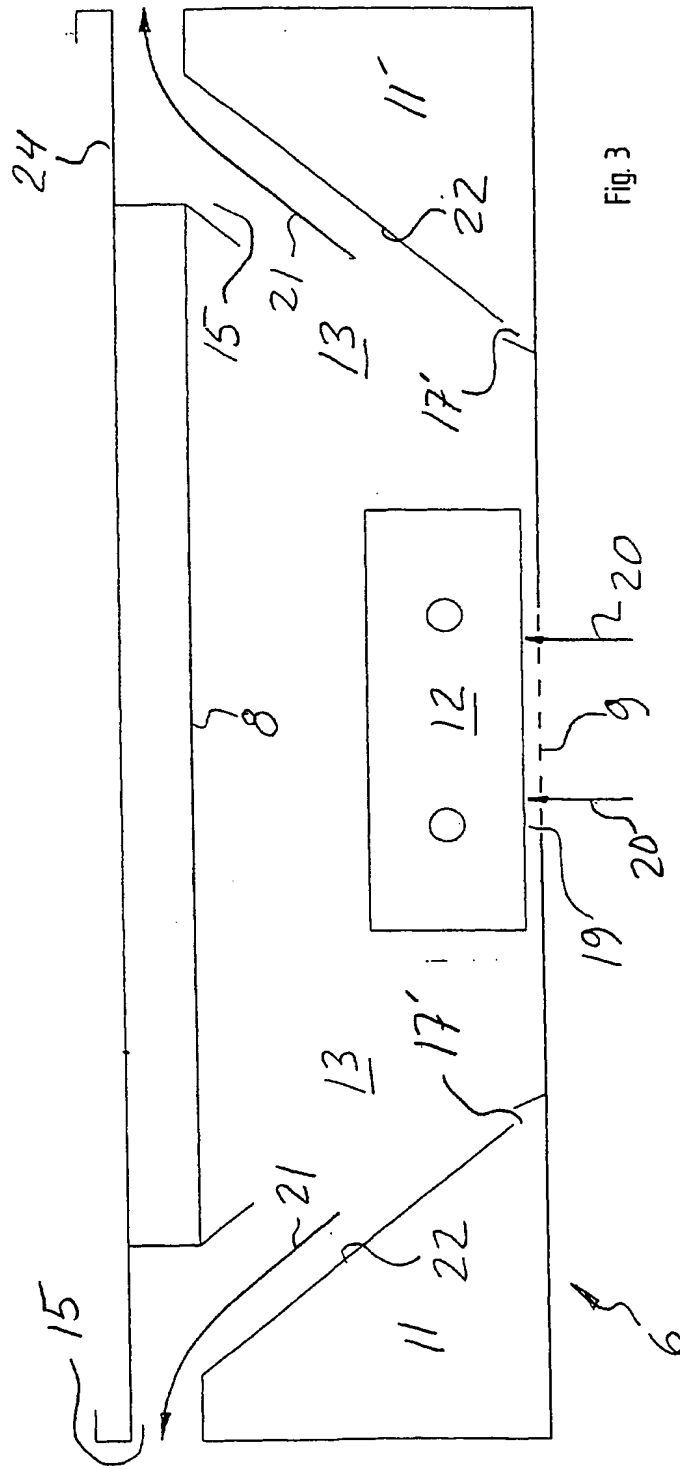


Fig. 3

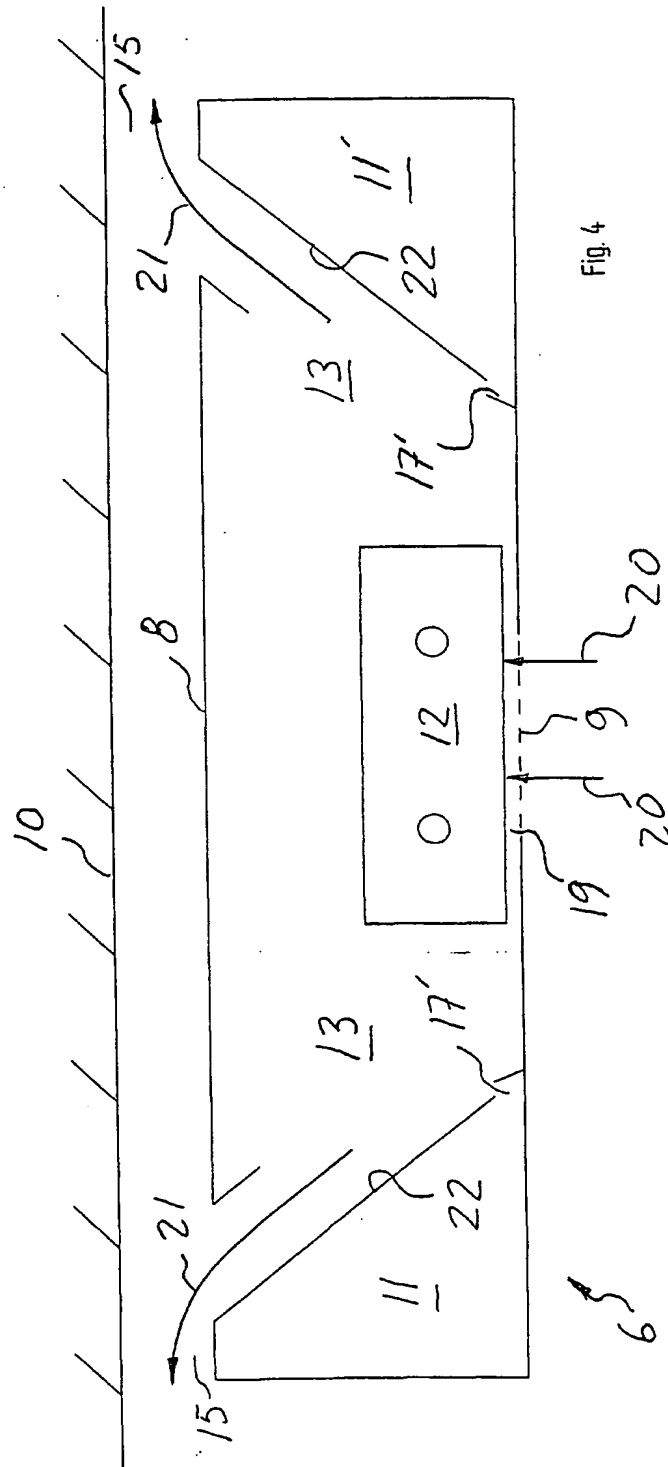


Fig. 4



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EUROPEAN SEARCH REPORT

Application Number
EP 01 85 0024

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
A	FR 1 363 374 A (IDÉAL STANDART) 25 September 1964 (1964-09-25) * the whole document *	1	F24F1/01
P,A	DE 200 11 500 U (LTG AG) 30 November 2000 (2000-11-30) * figures 5,11 *	1	
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			TECHNICAL FIELDS SEARCHED (Int.Cl.7)
			F24F
The present search report has been drawn up for all claims			
Place of search MUNICH		Date of completion of the search 11 May 2001	Examiner Lienhard, D
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